

BRIEF DESCRIPTION OF THE DRAWINGS

The features that are considered characteristic of this invention are set forth in the appended claims. This invention, however, both as to its origination and method of operations as well as additional advantages will best be understood from the following description when read in conjunction with the accompanying drawings in which:

FIG. 1 is a flow sheet denoting the invention as set forth in the appended claims.

FIG. 2 is a flow sheet denoting a method to produce a porous lignocellulose from a biomass.

FIG. 3 is a flow sheet denoting a method to produce glucose and ethanol from water soluble carbohydrates.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In the preferred embodiment of the present invention, as claimed within claim 1, a means of producing water soluble carbohydrates derived from lignocellulose is presented. The water soluble carbohydrates are derived by hydrolysis of cellulose contained in a lignocellulose by enzymes.

The flow diagram of **Fig. 1** illustrates the general preferred embodiment of the present invention. In the diagram, rectangles represent stages, operations or functions of the present invention and not necessarily separate components. Arrows indicate direction of flow of material within the method.

Referring to **Fig. 1**, lignocellulose 10 is conveyed to hydrolysis stage 12 and combined with enzymes 14 and subjected to hydrolysis. Hydrolysis residue 22, containing water and constituents from hydrolysis stage 12 is conveyed to filter stage 24 and filtered to produce filtrate 28 and filtered residue 26 conveyed to extract stage 30. Filtered residue 26 is extracted by water 34 to produce extractate 36 and extracted residue 32. Extractate 36, containing water, is conveyed to hydrolysis stage 12, to provide water and extracted constituents for hydrolysis. Filtrate 28 is conveyed to membrane filtration stage 16 which is employed to separate dissimilar molecular weights to produce a solution of water soluble carbohydrates substantially devoid of enzymes 20 and produce enzymes 14 to be conveyed to hydrolysis stage for recycle 12. Membrane filtration stage 16 is generally an ultrafiltration membrane employed to separate dissimilar molecular weights. Hydrolysis of cellulose contained in lignocellulose is achieved by cellulase type enzymes to yield water soluble carbohydrates. Temperature and pH are adjusted within the hydrolysis environment to accomplish maximum hydrolysis rate allowed.

Porous lignocellulose, containing cellulose, renders cellulose readily accessible to cellulase enzymes.